

WHAT IS CLAIMED IS:

1. An optical wiring device comprising:
an electric connecting portion;
optical transmission means for transmitting an optical signal; and
5 an optical device for conducting an optoelectric conversion, said
optical device being provided between said electric connecting portion and
said optical transmission means, and said optical device including at least
one of a surface light emitting device, which is modulated by an electric
signal supplied through said electric connecting portion, and a surface
10 light receiving device, which converts an optical signal transmitted
through said optical transmission means to an electric signal.

2. An optical wiring device according to claim 1, wherein a
plurality of said optical devices are arranged and integrated.

3. An optical wiring device according to claim 1, wherein said
optical device is aligned with, optically coupled to and fixed to said
optical transmission means.

4. An optical wiring device according to claim 1, wherein said
electric connecting portion is a connector which can be removably connected
to an external electric element.

5. An optical wiring device according to claim 1, wherein said
optical transmission means includes a light input/output end surface, and
said optical device is surface-implemented on said light input/output end
surface with said surface light emitting or receiving device abutting said

light input/output end surface.

6. An optical wiring device according to claim 1, wherein said surface light emitting device is a surface emitting laser.

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7. An optical wiring device according to claim 1, wherein said surface light receiving device is a p-i-n photodiode.

8. An optical wiring device according to claim 1, wherein said surface light receiving device is a metal-semiconductor-metal (MSM) photodiode.

9. An optical wiring device according to claim 1, further comprising a wiring substrate, and wherein a plurality of said optical devices with respective independent electrodes are arranged in an array, said respective independent electrodes are bonded to said wiring substrate in a flip-chip manner, and said electric connecting portion includes a plurality of conductors to which said independent electrodes are electrically connected through said wiring substrate, respectively.

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10. An optical wiring device according to claim 9, wherein said wiring substrate includes a window for passing light from or to said optical device, and said optical device is optically coupled and bonded to said optical transmission means in a surface-implementation manner, with said wiring substrate interposed between said optical device and said optical transmission means.

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11. An optical wiring device according to claim 9, further comprising a plate with a window for passing light from or to said optical device, and wherein said optical device is optically coupled and bonded to said optical transmission means in a surface-implementation manner with
5 said plate interposed between said optical device and said optical transmission means.

12. An optical wiring device according to claim 9, wherein said wiring substrate is a flexible wiring substrate which is freely flexible.

13. An optical wiring device according to claim 1, further comprising an electronic circuit device for driving said optical device, said electronic circuit device being integrated on said electric connecting portion.

14. An optical wiring device according to claim 13, wherein said electronic circuit device has a parallel-to-serial converting function.

15. An optical wiring device according to claim 1, further comprising an electronic circuit device in which said optical device is electrically connected to an integrated circuit (IC), and wherein said optical device and said IC are integrated on a common Si substrate in a hybrid manner, and said optical device is implemented on said common Si substrate in a flip-chip manner.

16. An optical wiring device according to claim 9, wherein said optical device is a surface emitting laser sandwiched between said optical

transmission means and said wiring substrate, and said surface emitting laser is comprised of a cavity with an active layer sandwiched between multi-layer reflective mirrors with a growth semiconductor substrate removed.

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17. An optical wiring device according to claim 9, further comprising a plate, and wherein said optical device is a surface emitting laser sandwiched between said optical transmission means and said plate, and said surface emitting laser is comprised of a cavity with an active layer sandwiched between multi-layer reflective mirrors with a growth semiconductor substrate removed.

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18. An optical wiring device according to claim 1, wherein said optical transmission means comprises a waveguide sheet in which waveguide cores are arranged in an array.

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19. An optical wiring device according to claim 1, wherein said optical transmission means comprises an array of optical fibers.

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20. An optical wiring device according to claim 1, wherein said optical transmission means includes a metal thin film for conducting an electric connection.

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21. An optical wiring device according to claim 1, wherein said electric connecting portion is constructed such that said electric connecting portion is removably connected to an external receptacle of an electronic apparatus.

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22. An optical wiring device according to claim 1, wherein said electric connecting portion is constructed such that said electric connecting portion is electrically connected with a solder to a printed board provided in an electronic apparatus.

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23. An optical wiring device according to claim 1, wherein said optical device is a surface emitting laser, said surface emitting laser is driven directly by the on-and-off of a complementary metal-oxide semiconductor (CMOS) buffer at an output stage of an external apparatus that is connected to said electric connecting portion, and a driving current of said surface emitting laser is controlled by a resistor inserted serially with said surface emitting laser.

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24. An optical wiring device according to claim 1, wherein said optical device is a surface emitting laser, said surface emitting laser is driven directly by the on-and-off of a complementary metal-oxide semiconductor (CMOS) buffer at an output stage of an electronic circuit which is provided between said surface emitting laser and said electric connecting portion and electrically connected to said electric connecting portion, and a driving current of said surface emitting laser is controlled by a resistor inserted serially with said surface emitting laser.

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25. An electronic apparatus comprising:

a printed circuit board with an electronic integrated device; and

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an optical wiring device for connecting said printed circuit board to another apparatus, said optical wiring device including (a) an electric connecting portion, (b) an optical transmission means for transmitting an

optical signal, and (c) an optical device for conducting an optoelectric conversion, wherein said optical device is provided between said electric connecting portion and said optical transmission means, and said optical device is integrated and includes at least one of a surface light emitting device, which is modulated by an electric signal supplied through said electric connecting portion, and a surface light receiving device, which converts an optical signal transmitted through said optical transmission means to an electric signal.

26. An electronic apparatus comprising:

a computer;

a display with an input /output (I/O) port; and

an optical wiring device for connecting said computer to said display through said I/O port, said optical wiring device including (a) an electric connecting portion, (b) an optical transmission means for transmitting an optical signal, and (c) an optical device for conducting an optoelectric conversion, wherein said optical device is provided between said electric connecting portion and said optical transmission means, and said optical device is integrated and includes at least one of a surface light emitting device, which is modulated by an electric signal supplied through said electric connecting portion, and a surface light receiving device, which converts an optical signal transmitted through said optical transmission means to an electric signal.

27. An electronic apparatus comprising:

a computer;

a network; and

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an optical wiring device for connecting said computer to said network, said optical wiring device including (a) an electric connecting portion, (b) an optical transmission means for transmitting an optical signal, and (c) an optical device for conducting an optoelectric conversion, wherein said optical device is provided between said electric connecting portion and said optical transmission means, and said optical device is integrated and includes at least one of a surface light emitting device, which is modulated by an electric signal supplied through said electric connecting portion, and a surface light receiving device, which converts an optical signal transmitted through said optical transmission means to an electric signal.

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